



# 17th TechNet Conference

Panama City, Panama | October 16-19, 2023

Immunization Programmes That Leave No One Behind

[www.technet-21.org](http://www.technet-21.org)

Environmentally-sustainable  
interventions for  
strengthening PHC  
infrastructure and mitigating  
carbon emissions

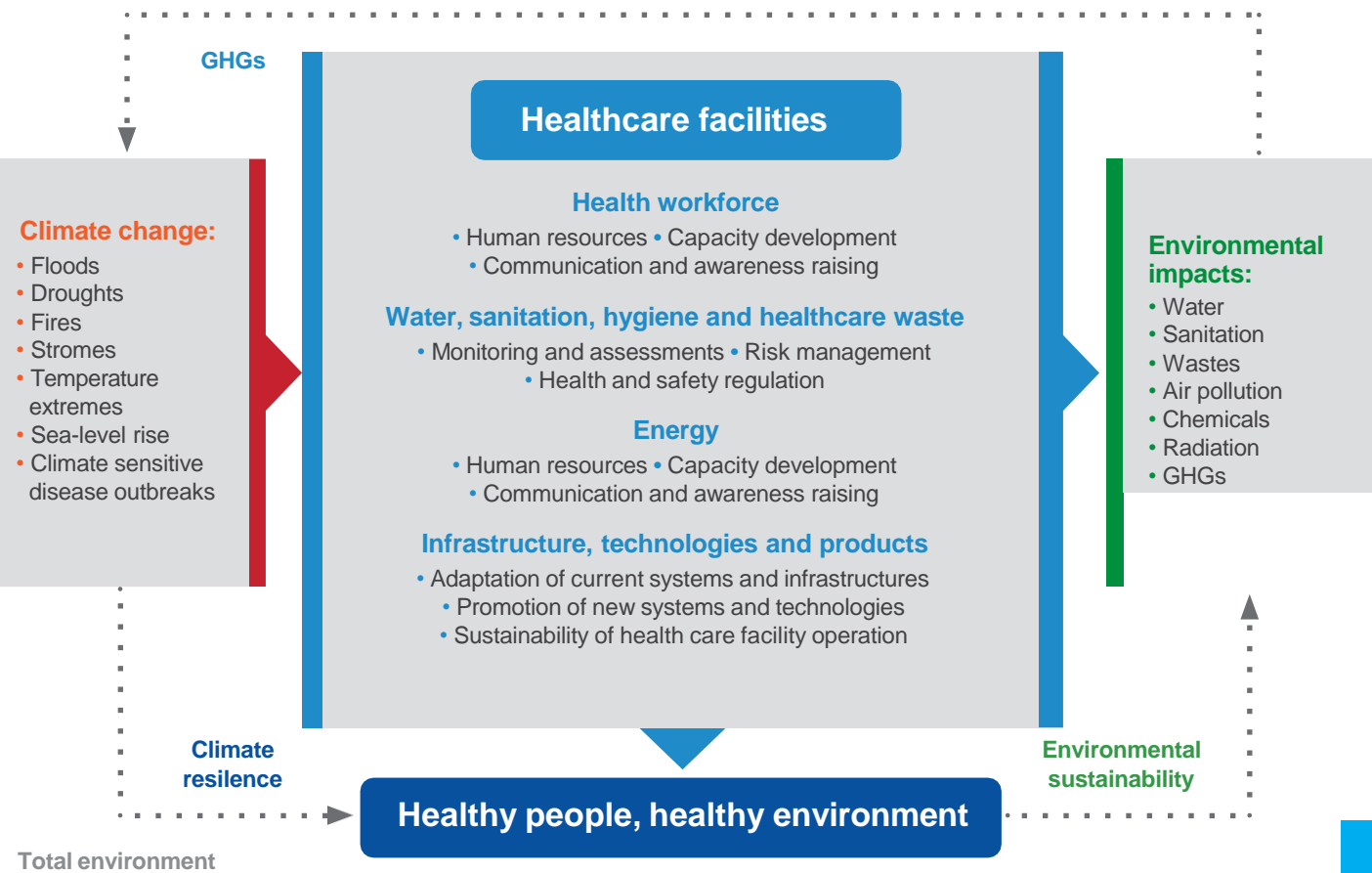
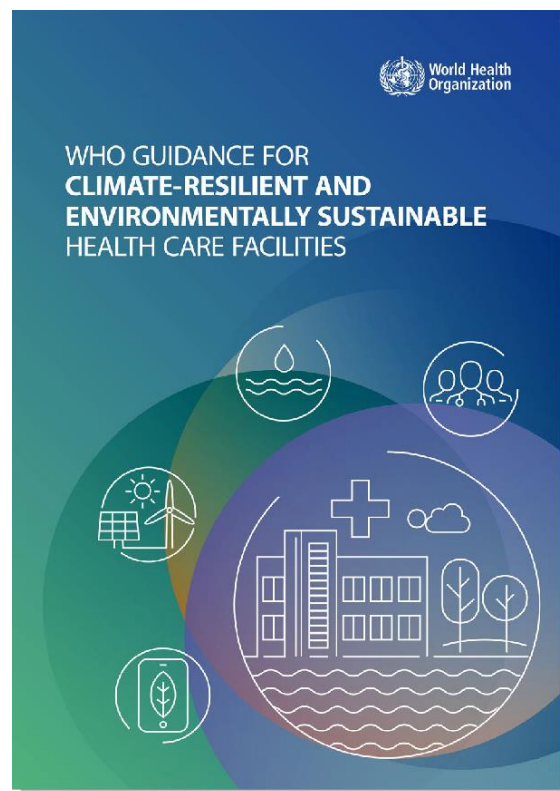
Ranjit Dhiman (UNICEF Programme Group)

# Problem definition



# Climate-resilient and environmentally sustainable health care facilities

## WHO guidance

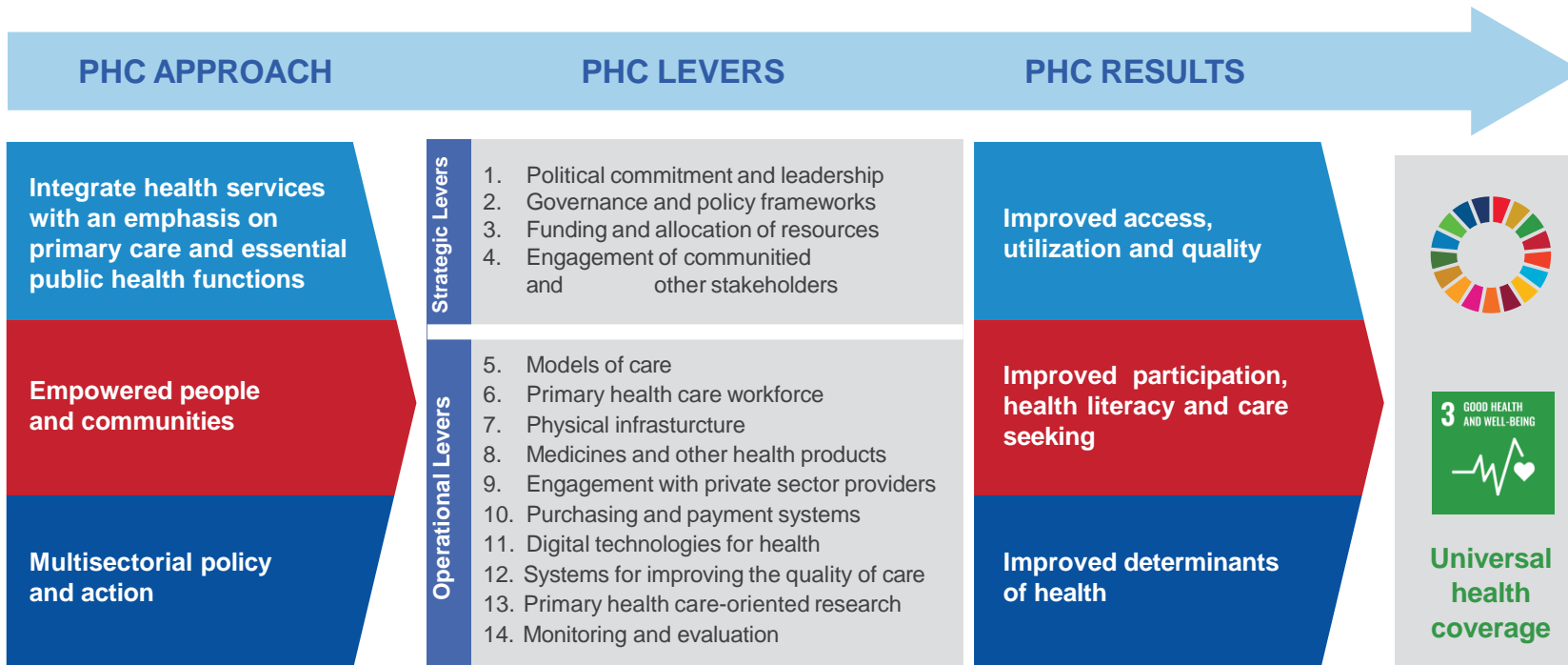
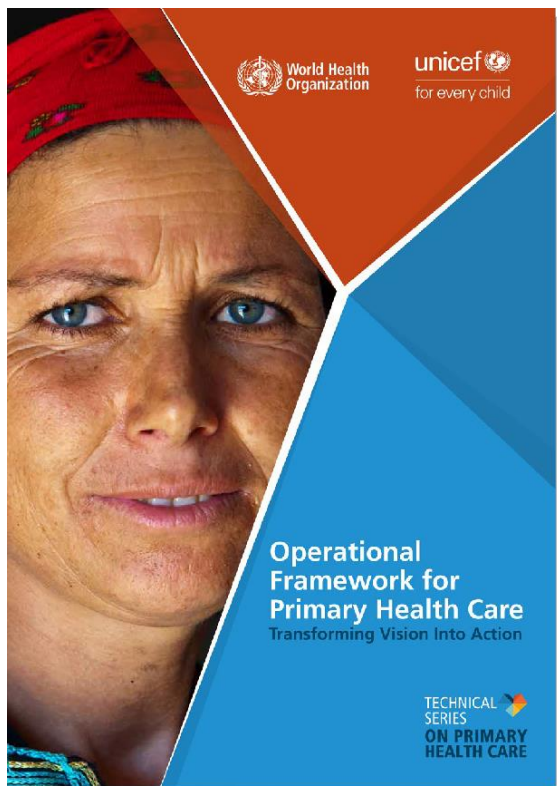


<https://www.who.int/publications/i/item/9789240012226>



# Climate-resilient and environmentally sustainable health care facilities

## Focus on strengthening primary health care infrastructure for essential health services



### Physical infrastructure

Secure and accessible health facilities to provide effective services with reliable water, sanitation and waste disposal/recycling, **telecommunications connectivity and a reliable power supply**, as well as transport systems that can connect patients to other care providers

# Electricity in healthcare facilities

## Reliable electricity in health care facilities is essential to save lives

- It is critical from managing childbirth and emergencies to immunization.
- It is also key to ensure basic services – from clean water supply to lighting and communications.
- Electricity access in healthcare facilities can make the difference between life and death.

## Close to 1 billion people in low- and lower-middle-income countries are served by health-care facilities without reliable electricity access or with no electricity access at all

- Only half of hospitals in sub-Saharan Africa have access to reliable electricity.
- There is also a sharp urban–rural divide: urban health-care facilities have more access to any electricity and more reliable electricity access than rural facilities in the same country.





# Carbon emissions for delivering immunization program globally



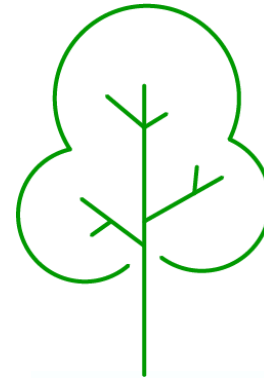
**350,125 (0.00094%** of global carbon emissions) Ton CO<sub>2</sub> equivalent estimated annual emissions from delivering immunization program



Annual emissions equivalent of **226,423** passengers flying on Dubai – New York economy class

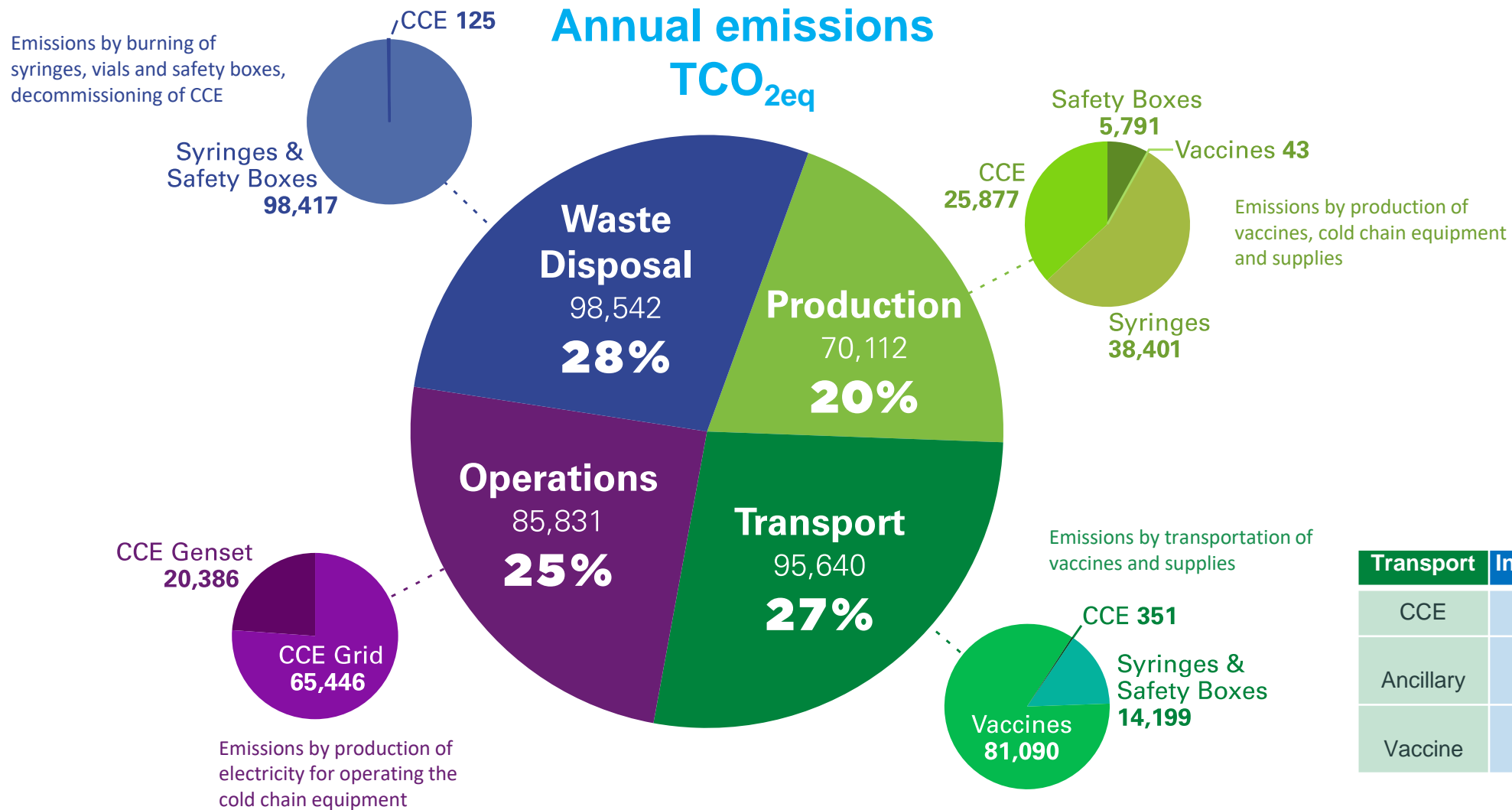


**3.07** kg CO<sub>2</sub> equivalent per FIC  
**166** g CO<sub>2</sub> equivalent emissions per vaccine dose administered to a child



Which can be mitigated by **5,789,347** tree seedlings grown for 10 years

# Key contributors of emissions



In TCO<sub>2eq</sub>

Transport	International	Domestic
CCE	141	211
Ancillary	5,688	8,511
Vaccine	70,282	10,808



# Healthcare waste: larger picture







# Strategy and Plan



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# For reduction of emissions....

## “Low hanging fruits” for reduction of emissions by **70%**

### Operations

Solarization / use of Renewable Energy hybrids can reduce total emissions by **25%**



### Transportation

77 folds reduction in emissions for shipping vaccines by sea as compared to air, i.e. total emissions reduced by **20.5%**



### Disposal

Upcycling of plastics as against incineration, into useful products, reduces total emissions **25%**



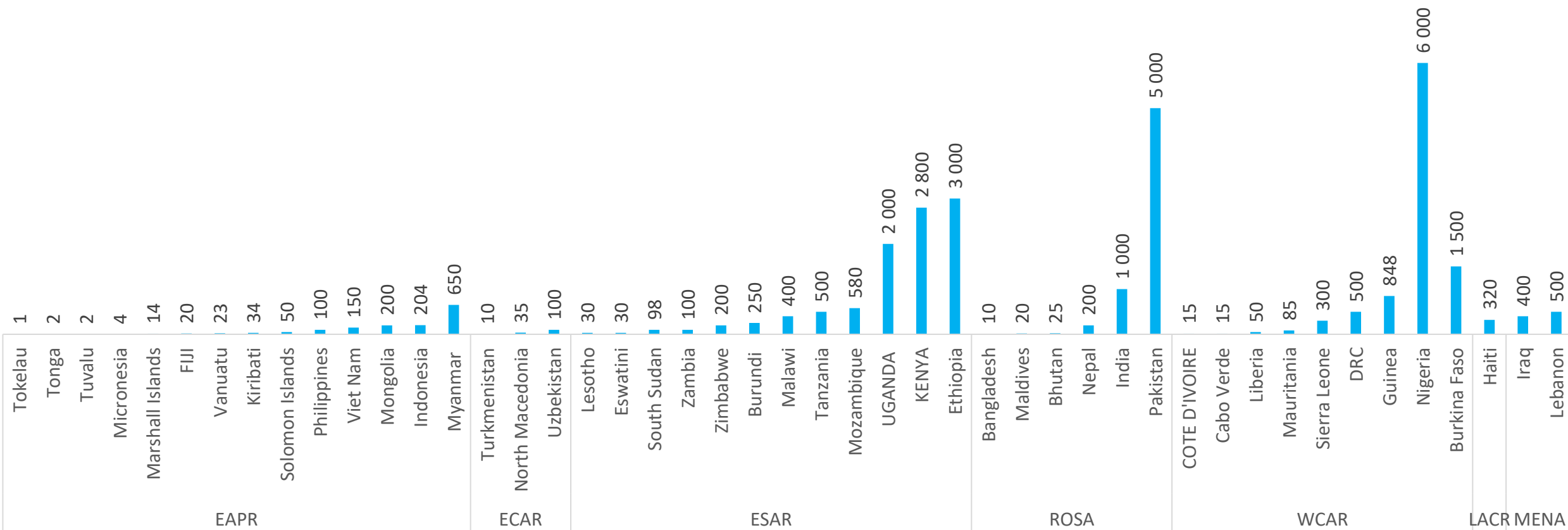


# Solarization of health facilities



# The demand for solarization

Demand for solarization of health facilities : UNICEF Survey





# Essential health services that need reliable electricity



## Reliable electricity is necessary to power critical medical devices.

For example, in maternal and newborn care, reliable electricity is needed for **baby warmers, spotlights, suction units, oxygen concentrators, phototherapy, diagnostic equipment etc.**

In immunization, **vaccines refrigerators and freezers** need electricity to maintain the cold chain (cold chain is also necessary to store blood, medicines and drugs). Laboratories also need electricity, for example for **centrifuges, microscopes and sterilizers.**

Electricity is also essential to ensure **basic amenities, such as lighting, clean water, ventilation, space heating and cooling, communication.**

Access to electricity allows **prolonged hours of operation** of healthcare facilities (for example allowing to effectively work at night) and is crucial to enable specific services, such as telemedicine and remote care.

Electricity access in health-care facilities, especially in rural and remote areas in low resource settings, is also important to **facilitate recruitment and retention** of health-care staff as well as to increase their morale and motivation. Electricity access also increases the **sense of safety and security for patients and staff.**

# UNICEF support to countries

- **Target:**  
Primary health care (PHC) facilities without reliable electricity & **other criteria\*** per country.
- **Services Included:**
  - Preliminary HFSE Sample Assessment,
  - Design, Procurement and Transport,
  - Commissioning of solar systems
  - Operation & Maintenance of Solar Systems
  - Wiring of the facility and
  - Capacity building of the Government
- **Targeted Lifecycle of HFSE Eqp: 10 years**
- **TA by UNICEF**  
to support coordination with government/stakeholders and manage the in-country processes
- **Sustainability Plan:**  
Monitoring, Management & O&M Strategy in place at Country Level for ensuring 10-year operation

\* Other Criteria: Priority region, government owned, permanent structure, cold chain points etc.





# UNICEF and WHO Partnership to solarize 10,000 HFJs together

**WHO and UNICEF will co-lead the Initiative** in cooperation with national governments, and with the technical support from SELCO Foundation. Furthermore the following specific responsibilities are envisaged



Identification of critical healthcare/energy needs in each country – medical services and devices

Techno-economic analyses, including energy needs assessment, solar systems design, analysis of costs, technical feasibility, long term sustainability, etc.

Training, capacity building and knowledge transfer mechanisms

Performance monitoring, health impact



Long term agreements with potential global and national suppliers

Procurement of solar systems, medical devices and appliances

Commissioning of solar systems and medical devices and operations and maintenance arrangements



WITH THE TECHNICAL SUPPORT OF

**SELCO Foundation**

Provides technical support to WHO and UNICEF on assessment, system design, implementation, operation and maintenance

*Coordination and cooperation with other relevant actors will be ensured at country level, depending on specific country contexts, in order to avoid duplications, leverage on synergies and maximise impact*

# Varying sizes of solar systems solutions

## Type 1 1.5 - 3 kW

Provide preventive and curative outpatient services and oversee all the village health services.



## Type 2 ~ 5 kW

Vaccinations, antenatal and postnatal care, family planning, birth assistance, health education, etc.



## Type 3 8 - 10 kW

In addition to Type 2, in-patient services, maternity care, laboratory services, a first referral center for dispensaries and mortuary services, and selected surgical services.





# Healthcare Waste Management

Building Safe and Environmentally Sustainable  
Healthcare Waste Management Solutions in Low-  
Middle Income Countries



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The term healthcare waste includes all waste generated within healthcare facilities, research centers and laboratories related to medical procedures. In addition, it includes the same types of waste originating from minor and scattered sources,



# Key actions on waste management 2022-24

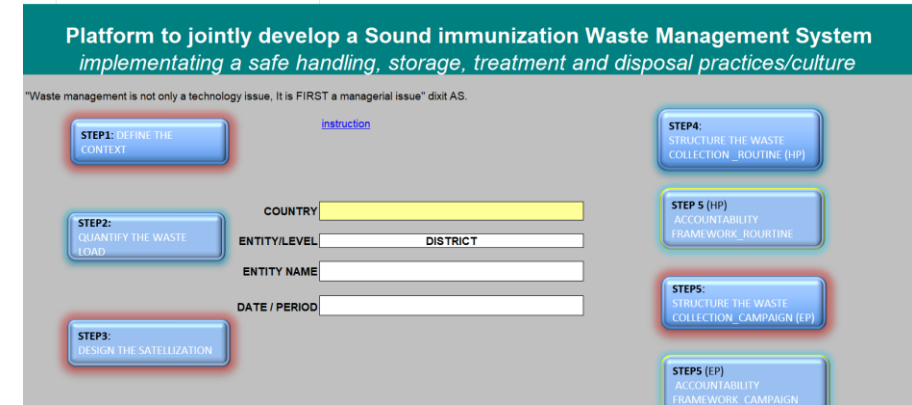
## Capacity building



Technical brief

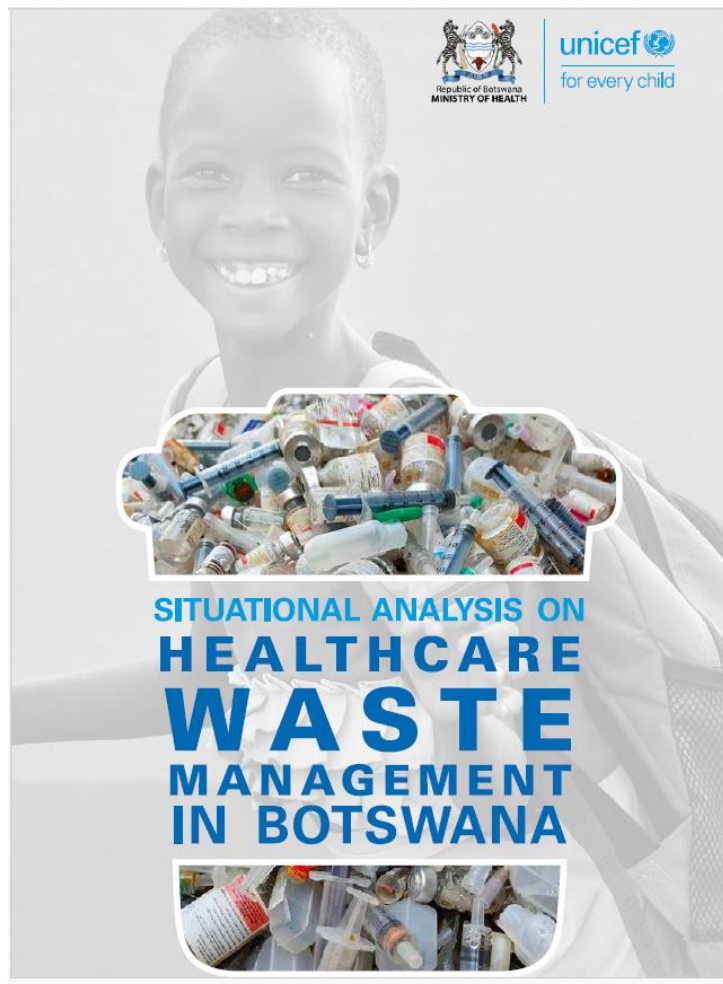


SOPs



Guidance and resources on TechNet-21 portal  
Regular webinar series

# Assessments and roadmap



10 years roadmap with immediate, short term and long term budgeted action plan

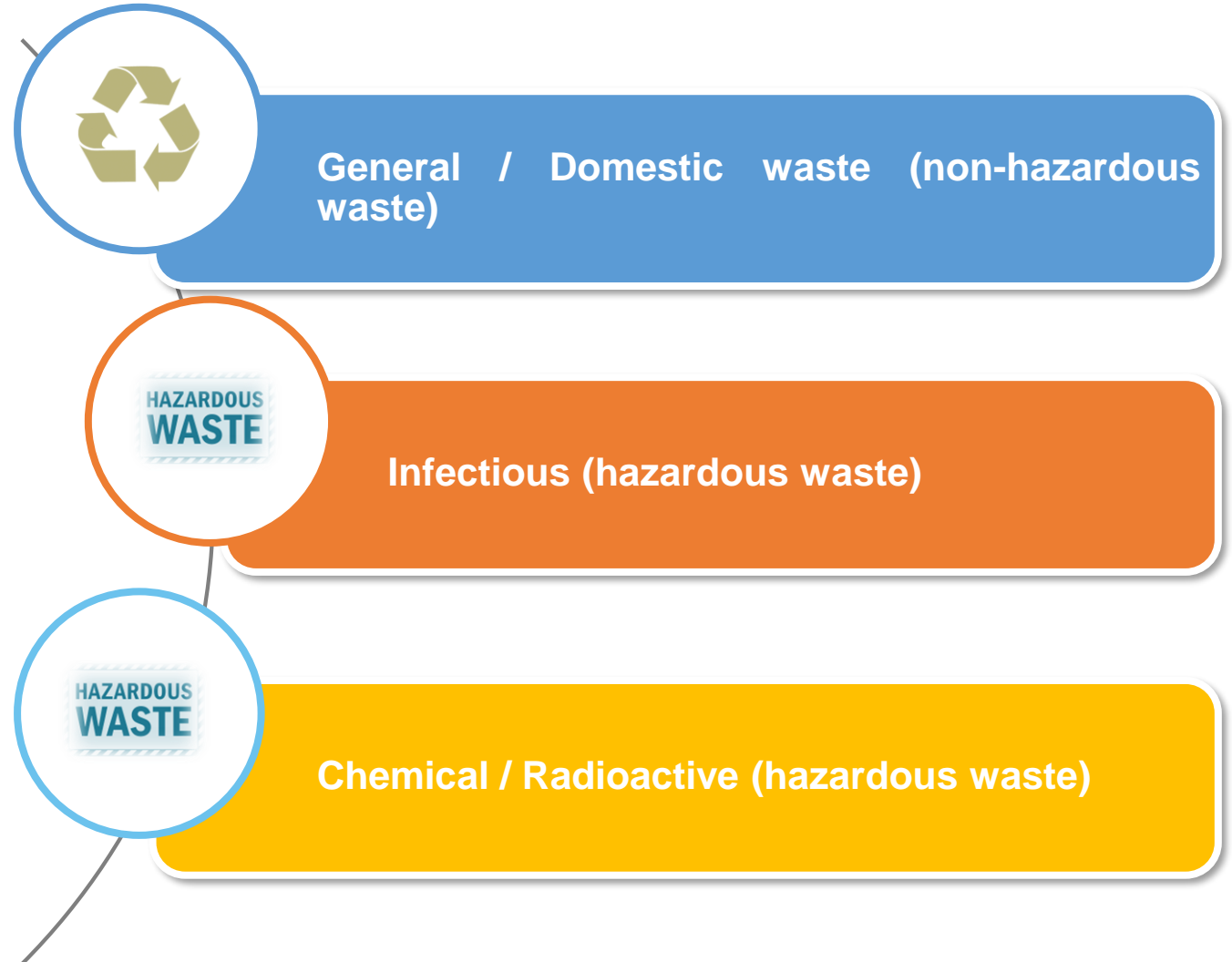
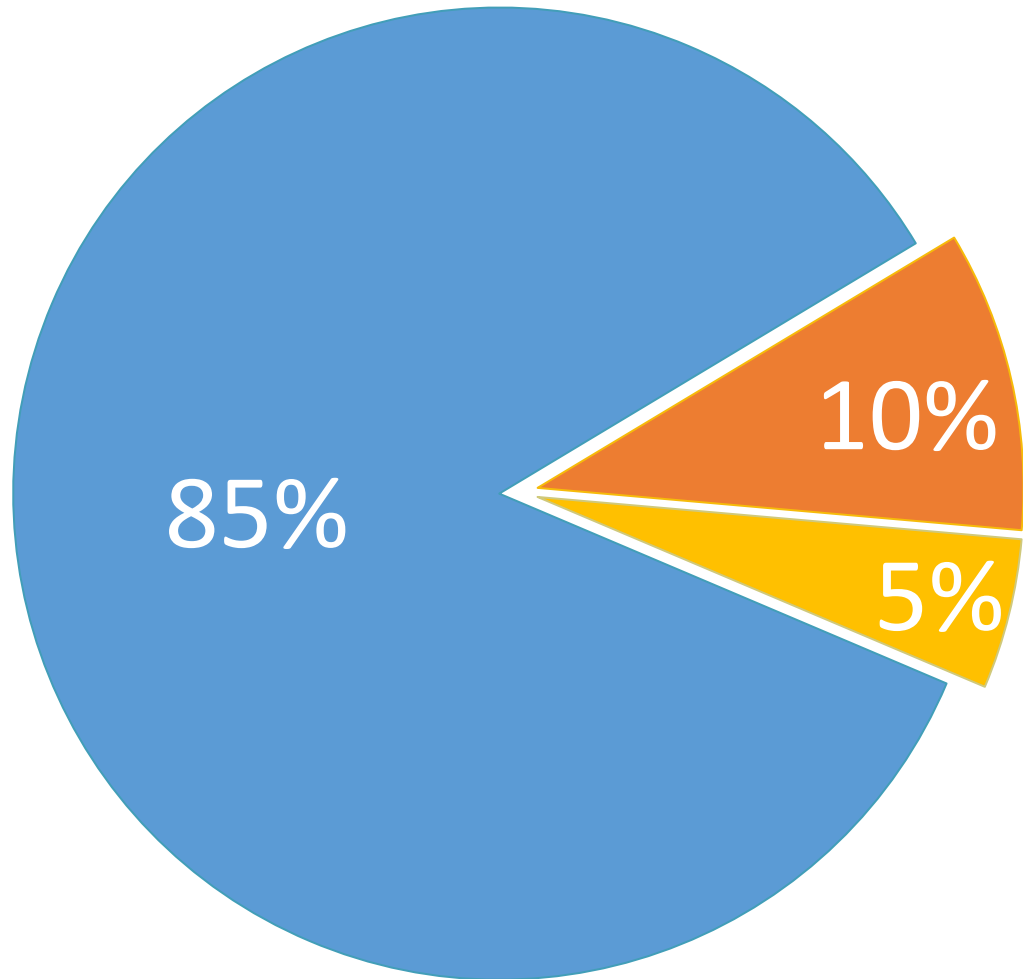




# Assessments and roadmap development 2023 with support from UNICEF HQ



# Waste Composition - Healthcare facilities





1. Reduction of unsafe risks to the healthcare workers during waste management operations,
2. Reduction of exposure to emissions (including dioxins and furans) and contaminants,
3. Reduction of waste volumes in health facilities; and
4. Bundled services, such as: installation, training, and maintenance of HCW equipment.



## Annex E: TECHNICAL SPECIFICATIONS OF HEALTHCARE WASTE TREATMENT EQUIPMENT

### CATEGORY 1: Autoclave with shredder

General	
Equipment	Healthcare Waste Treatment Autoclave
Capacity	For batch units: litres per cycle or kg per cycle For continuous or semi-continuous units: kg/hour
Cycle Time	Maximum 60 minutes per cycle
Working pressure	Minimum 2 bars or higher
Working temperature	Minimum 121°C or higher
Electrical	220-V, 3-Ph, 50-Hz
Footprint	Define footprint of the space required for the plant including all associated plant and equipment
Pressure vessel standard	Must comply with ASME Boiler and Pressure Vessel Code Section VIII or EN 13445
Safety Features	
Redundant overpressure	Overpressure sensor linked to a pressure relief safety valve plus a rupture disc or equivalent pressure limiting device to keep the pressure below the maximum allowable pressure
Door interlock	Door interlock system to prevent opening door while vessel is under pressure. Safety feature shall also prevent start-up of a cycle if the door is open or not properly locked
Sliding door	In case of sliding door movement, the safety feature shall ensure that the door movement is stopped if an object is detected in front of the door
Safety valves	Both chamber and jacket must be equipped with pressure relief valves to prevent excess chamber pressure

## UNICEF LTA for products

- Category 1: Autoclaves with shredders
- Category 2: Microwaves with shredders
- Category 3: Dry / Friction Heat Treatment System with shredders



*Autoclave with shredder*



*Frictional Heat with shredder*

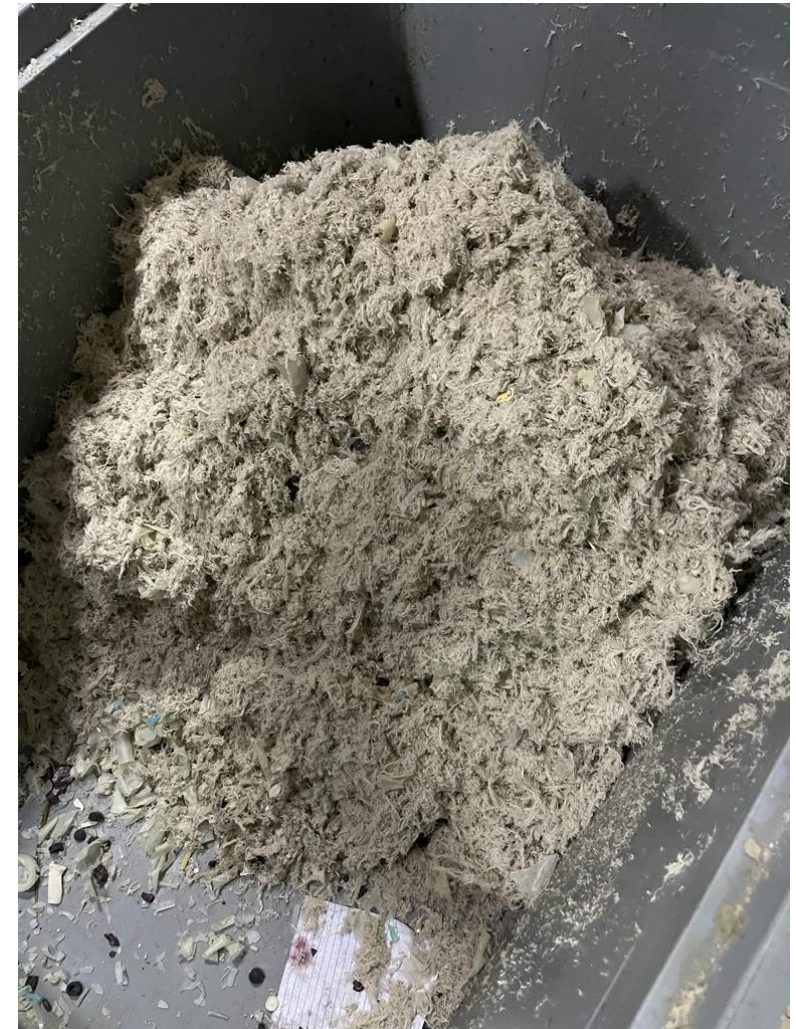


*Microwave with shredder*

# SAFE TREATMENT OF HEALTHCARE WASTE



# Transformation of infectious waste into recyclable waste





# Thank You!

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